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NOTE. Professor Scheffer sent in solutions of problems 118 and 119, and Professor Ellwood of problem 119. In the published solutions of No. 119, the following errors occur in the statement : For $1.\frac{9}{.100}$, read $1.\frac{9}{.001}$; line 8 from the bottom, for “\$9001, the selling price,” read “\$9001, the cost price;” at top of page 270, for $1 + \frac{9}{.009}$ read $1 + \frac{9}{.001}$

ALGEBRA.

97. Proposed by F. M. SHIELDS, Coopwood, Miss.

A farmer had 2080 pounds of grain at the depot, and gave a wagoner .75 cents per 100 pounds to haul it, paying him in the *same* grain at the following prices, viz.: 3-10 of the hauling bill was paid in corn at .58 cents per bushel of 56 pounds; 3-5 was paid in wheat at 1.55 cents per bushel of 60 pounds, and the balance of the bill was paid in oats at .36 cents per bushel of 32 pounds, the wagoner not charging for hauling his own grain. The load being delivered, how many bushels of each kind of grain did the wagoner get, and how many bushels of each kind did the farmer have left after paying the wagoner?

I. Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa., and C. B. GOULD, Colorado College, Colorado Springs, Col.

Let x = the hauling bill.

$x \div .75 = \frac{4}{3}x$ = number of hundredweight hauled.

$\therefore 400x/3$ = number of pounds hauled.

$(\frac{3}{10}x \div .58)56 = \frac{3}{10}x \times \frac{5}{2} \times \frac{56}{1} = 840x/29$, pounds corn received by wagoner.

$(\frac{5}{10}x \div 1.55)60 = \frac{5}{10}x \times \frac{3}{1} \times \frac{60}{1} = 720x/31$, pounds wheat received by wagoner.

$(\frac{1}{10}x \div .36)32 = \frac{1}{10}x \times \frac{2}{9} \times \frac{32}{1} = 80x/9$, pounds oats received by wagoner.

$\therefore 2080 - 400x/3 = 840x/29 + 720x/31 + 80x/9$.

$\therefore x = \$10.698843$, hauling bill.

$3x/5.80 = 5.5338843$ bushels of corn wagoner received.

$6x/15.50 = 4.1414877$ bushels of wheat wagoner received.

$x/3.60 = 2.9719008$ bushels of oats wagoner received.

$400x/3 = 1426.5124$ pounds hauled for farmer.

$\frac{3}{10}$ of $400x/3 = 40x$, $\frac{5}{10}$ of $400x/3 = 80x$, $\frac{1}{10}$ of $400x/3 = 40x/3$.

$40x \div 56 = 7.6420307$ bushels of corn farmer had left.

$80x \div 60 = 14.2651240$ bushels of wheat farmer had left.

$40x/3 \div 32 = 4.45785125$ bushels oats farmer had left.

II. Solution by J. D. CRAIG, Frankfort, N. J., and P. S. BERG, A. M., Principal of Schools, Larimore, N. D.

Let $40x$ = number of pounds of grain farmer retained.

Then $\frac{3}{4} \times 40x = 30x$ = cents paid for carting.

$\frac{3}{10}$ of $30x = 9x$ = cents paid for carting corn.

$\frac{5}{4}$ of $30x = 18x$ = cents paid for carting wheat.

$\frac{1}{10}$ of $30x = 3x$ = cents paid for carting oats.

$9x \div \frac{3}{4} = 12x$ = pounds of corn farmer retained.

$18x \div \frac{5}{4} = 24x$ = pounds of wheat farmer retained.

$3x \div \frac{3}{4} = 4x =$ pounds of oats farmer retained.

$9x/58 \times 56 = \frac{252}{9}x =$ pounds of corn wagoner received.

$18x/155 \times 60 = \frac{216}{155}x =$ pounds of wheat wagoner received.

$3x/36 \times 32 = \frac{8}{9}x =$ pounds of oats wagoner received.

$40x + \frac{252}{9}x + \frac{216}{155}x + \frac{8}{9}x = 2080$ pounds of grain.....(1).

Solving, $x = 35\frac{4}{9}\frac{8}{9}$.

Therefore, $12x = 427\frac{2}{3}\frac{7}{9}$ pounds of corn retained by farmer.

$24x = 855\frac{8}{9}\frac{8}{9} =$ pounds of wheat retained by farmer.

$4x = 142\frac{3}{9}\frac{8}{9} =$ pounds of oats retained by farmer.

$\frac{252}{9}x = 309\frac{8}{9}\frac{8}{9} =$ pounds of corn paid wagoner.

$\frac{216}{155}x = 248\frac{2}{9}\frac{8}{9} =$ pounds of wheat paid wagoner.

$\frac{8}{9}x = 95\frac{8}{9}\frac{8}{9} =$ pounds of oats paid wagoner.

Reducing to bushels we find that the farmer retains $7\frac{1}{2}\frac{8}{9}$ bushels corn, $14\frac{8}{9}\frac{8}{9}$ bushels of wheat, and $4\frac{2}{3}\frac{8}{9}$ bushels of oats.

The wagoner gets $5\frac{6}{9}\frac{8}{9}$ bushels corn, $4\frac{4}{3}\frac{2}{9}\frac{8}{9}$ bushels wheat, and $2\frac{5}{9}\frac{8}{9}$ bushels oats.

III. Solution by B. F. SINE, Principal of Capon Bridge Normal School, Capon Bridge, W. Va.; ALOIS F. KOVARIK, Instructor in Mathematics and Physics, Decorah Institute, Decorah, Ia.; and O. S. WESTCOTT, Principal North Division High School, Chicago, Ill.

Let x , y , and z equal, respectively, the number of pounds of corn, wheat, and oats that the farmer had left. Then from the condition of problem we have

$$\frac{3}{10} \left[\frac{.75}{.58} \frac{(x+y+z)}{100} \right] 56 = \frac{x}{100} \times \frac{.75}{.58} \times 56,$$

or, by reducing, we have $7x - 3y + 3z = 0$(1), and in like manner we get $3x - 2y + 3z = 0$(2), and $x + y - 9z = 0$(3), from which we get $y = 2x = 6z$.

$\therefore x + y + z = 10z$.

$75 \cdot \frac{z}{100} \cdot \frac{32}{36} = \frac{2}{3}z =$ pounds of oats wagoner received, and in like manner $\frac{8}{9}z$

and $\frac{8}{9}z$ equal pounds of wheat and corn that the wagoner received for hauling.

$\therefore$ we have $2080 - 10z = \frac{2}{3}z + \frac{8}{9}z + \frac{8}{9}z$.

$\therefore z = 142\frac{5}{9}\frac{2}{9}$ pounds or $4\frac{2}{3}\frac{8}{9}$ bushels of oats farmer received.

$y = 6z = 855\frac{11}{9}\frac{2}{9}$ pounds or $14\frac{2}{3}\frac{5}{9}\frac{8}{9}$ bushels of wheat farmer received.

$x = 3z = 427\frac{5}{9}\frac{2}{9}$ pounds or $7\frac{2}{3}\frac{2}{9}\frac{8}{9}$ bushels of corn farmer received.

$\therefore$ If the wagoner received 75 cents per 100 pounds for hauling, he received—

$7\frac{1}{3}\frac{8}{9}\frac{8}{9}$ pounds or $2\frac{7}{9}\frac{4}{9}\frac{8}{9}$ bushels of oats,

$2\frac{4}{3}\frac{7}{9}\frac{4}{9}$ pounds or $5\frac{1}{3}\frac{8}{9}\frac{8}{9}$ bushels of corn,

$1\frac{9}{8}\frac{4}{9}\frac{8}{9}$ pounds or $4\frac{1}{8}\frac{1}{9}\frac{2}{9}\frac{8}{9}$ bushels of wheat.

We understand the problem to mean that the wagoner received corn for hauling corn, wheat for wheat, etc.